

Arboviral Disease¹

Agent(s): In Virginia, the agents of arboviral infection, from most to least common, are the mosquito-borne West Nile virus (WNV), La Crosse encephalitis (LAC) virus, St. Louis encephalitis (SLE) virus and Eastern equine encephalitis (EEE) virus. Other arboviral agents causing illness in Virginians include imported Zika virus, dengue virus (DENV I-IV) and chikungunya virus (CHIKV), which typically infect travelers to endemic regions of the tropics and subtropics, but have not become established in Virginia's mosquito population. Virginia has also had cases of Zika virus via other routes of transmission. Powassan (POW) virus, which is a tick-borne encephalitis virus, was discovered in Virginia in 2009.

Mode of Transmission: Most commonly through the bite of an infected mosquito. WNV and Zika virus may also be transmitted by blood products via transfusion or transplanted organs from infected donors, and more rarely by cuts or punctures with contaminated scalpels or needles in a laboratory. Zika virus may also be sexually transmitted and transmitted from a mother to her fetus during pregnancy or around the time of birth. There has been one case of unknown transmission of Zika virus in the U.S., and the route of transmission is suspected to be close personal contact with a patient with an uncharacteristically high level of viremia.

Signs/Symptoms: Severity of symptoms differs depending on the particular virus and characteristics of the infected person. Most infections are asymptomatic. Mild cases may appear as fever with headache. More severe disease can cause encephalitis (i.e., inflammation of the brain) or meningitis (i.e., inflammation of the lining of the brain and spinal cord) and may lead to long term or permanent neurological impairment, or death. Dengue virus serotypes may cause fever, headache, body pain and a rash as well as mild or severe hemorrhagic symptoms in some patients. Chikungunya causes fever, headache, rashes, and severe, debilitating joint pain/arthritis in joints of the extremities (hands, arms, feet and legs). Unlike other arboviral diseases, Zika virus is less likely to cause encephalitis or meningitis, but has been linked to Guillain-Barré syndrome (GBS) and other neurological manifestations. Zika virus may cause several or more of the following symptoms, including a rash, myalgia, headache, fever, arthralgia or arthritis, and eye pain, as well as conjunctivitis. Zika virus can also cause congenital infections which may lead to fetal loss, ocular abnormalities, neural tube defects, microcephaly, or a distinct pattern of other birth defects, called congenital Zika syndrome. Congenital Zika syndrome is characterized by one or more of the following features: severe microcephaly with a partially collapsed skull, decreased brain tissue with a specific pattern of brain damage, damage to the back of the eye, joints with limited range of motion, or too much muscle tone that restricts body movement soon after birth.

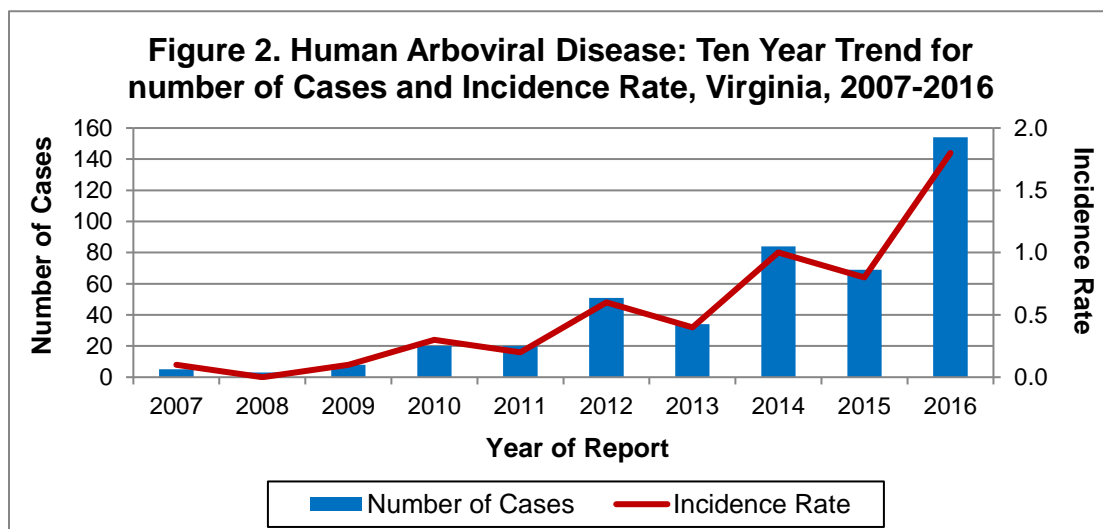
Prevention: Minimize bites by avoiding areas infested by mosquitoes or ticks, and, when in those areas, use mosquito or tick repellents and wear long-sleeved, light-colored clothing with pants legs tucked into socks. Additional mosquito control measures include

¹ The title of the arboviral section was changed from Arboviral Infection to Arboviral Disease to reflect the incorporation of Zika virus into the arboviral section. Zika virus disease and Zika virus infection cases are reported by VDH to the Centers for Disease Control and Prevention (CDC); however, only Zika virus disease cases are reported externally by CDC and VDH. The Virginia Reportable Disease List will continue to require reporting of all Arboviral infections.

maintaining screens on all open windows and doors and eliminating or regularly dumping all containers that could hold water and breed mosquitoes, including buckets, birdbaths and discarded tires. After visiting tick habitats, a person should thoroughly check all body surfaces for ticks and, if found, carefully remove attached ticks as soon as possible. Zika can also be prevented by practicing safe sex habits, by properly using a condom if a partner has traveled to an area with risk of Zika, or by abstaining from sex. Women with possible exposure to Zika virus should follow these recommendations for at least eight weeks, and men should follow these recommendations for at least six months. Blood collection centers in the U.S. and U.S. Territories began screening all donations for Zika virus with an individual donor nucleic acid test in 2016. All screening test positive donations are removed from the blood supply and undergo confirmatory testing.

Other Important Information: WNV and SLE infections are more likely to cause severe disease in persons over the age of 50, but the majority of infections are asymptomatic. LAC is seen primarily in individuals less than 16 years of age. EEE has a high fatality rate and is more likely to affect children under the age of 15 and adults over the age of 50 years. Dengue or chikungunya may affect persons of all ages. Dengue, chikungunya, and Zika viruses are found primarily in the tropical regions of the world, and travelers to those regions may become infected and return to Virginia carrying one of these viruses. In Virginia, Asian tiger mosquitoes, and the rare yellow fever mosquito, are capable of becoming infected with dengue, chikungunya or Zika if they bite an infected traveler, which could potentially result in local mosquito-borne transmission of these viruses.

Arboviral Disease: 2016 Data Summary	
Number of Cases:	154
5-Year Average Number of Cases:	51.6
% Change from 5-Year Average:	+191%
Incidence Rate per 100,000:	1.8



Human

In 2016, the World Health Organization (WHO) declared Zika virus a public health emergency of international concern, and the disease became a reportable condition in the United States. The Centers for Disease Control and Prevention (CDC) also released interim case definitions for Zika virus cases. The Virginia Department of Health has reported Zika virus cases to the CDC Arboviral Diseases Branch since January 2016. VDH case counts for Zika virus disease in 2016 will not match those reported by CDC because four of the cases had onset in 2015 and are included in the CDC case counts for 2015, but in the VDH case counts for 2016.

In 2016, 154 cases of arboviral disease were reported in Virginia. This case count is substantially higher than the previous 5-year average of 51.6 cases per year. The incidence of arboviral disease increased from 0.8 cases per 100,000 in 2015 to 1.8 cases per 100,000 in 2016 (Figure 2). The higher number of reported arboviral disease cases in 2016 compared to 2015 was attributed to the 2015-2016 Zika virus outbreak in the Americas. When Zika cases are excluded, the number of arboviral disease cases actually decreased from 69 in 2015 to 41 in 2016.

The majority (92%) of arboviral disease cases were acquired through travel to another country, and 1% were acquired indirectly due to travel (i.e., local sexual transmission by a sexual partner who traveled to a Zika affected country). One Zika virus disease case was acquired in Florida during the time of active local mosquito-borne Zika virus transmission. Two Zika virus disease cases were acquired via sexual transmission, and one case was transmitted transplacentally. There were no locally acquired cases of Zika from infected mosquitoes in Virginia. All six chikungunya virus disease cases were acquired during travel to foreign countries. The seven West Nile virus cases were determined to be acquired in the U.S., six in Virginia and one in Florida. No cases of La Crosse encephalitis, St. Louis encephalitis, Eastern equine encephalitis or Powassan virus were reported in 2016.

Zika virus disease occurred in every age group, with most cases being reported from the 20-29 year age group, followed by the 30-39 year age group. The median age was 33 years. Seventy-three (65%) Zika virus disease cases occurred in females and 40 (35%) occurred in males.

The Virginia Department of Health participates in CDC's U.S. Zika Pregnancy Registry (USZPR). Information is collected for the USZPR when a pregnant woman or her infant have laboratory evidence of Zika virus. The additional information helps to plan and support future clinical care recommendations, services, and prevention strategies. The USZPR reports data for three pregnancy outcomes: completed pregnancies with or without birth defects; liveborn infants with birth defects; and pregnancy losses with birth defects. In 2016, Virginia identified 50 completed pregnancies with or without birth defects, two liveborn infants with birth defects, and one pregnancy loss with birth defects.

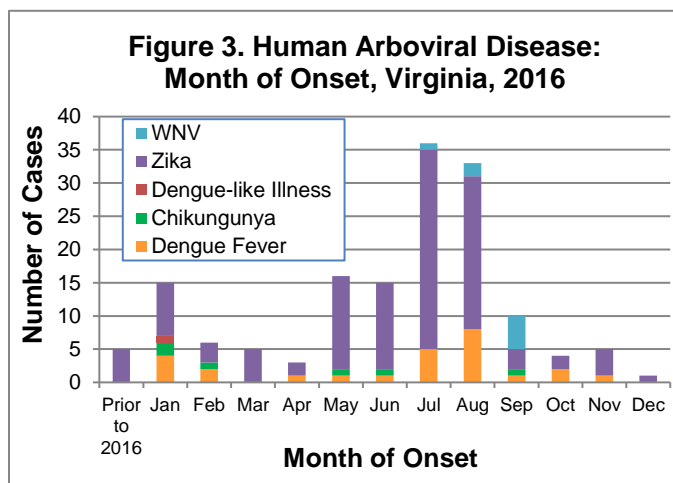
The 24 asymptomatic Zika virus infection cases reported in Virginia in 2016 are not included in this report. Only those cases that meet clinical criteria for Zika virus disease are included.

Six chikungunya virus disease cases were reported in 2016, with five cases being reported among persons 30-49 years of age and one case among those 60 years and older. Four cases were female and two cases were male. Two cases occurred in persons who traveled to India, and the remaining four cases were associated with travel to Central and South America. India has had a re-emergence of chikungunya since 2006, and chikungunya cases associated with travel to the American tropics resulted from the introduction and spread of the virus into the tropical Americas beginning in 2013.

All 27 dengue cases occurred among people who traveled to dengue endemic countries of Central America, South America, the Caribbean, or south Asia. The age range of persons with dengue virus infection was 18-77 years. Twelve (44%) of the 27 dengue cases were female. While no cases of dengue hemorrhagic fever were reported in 2016, one case of dengue-like illness was reported.

The number of WNV cases substantially decreased in 2016. Eight cases were reported in 2016, compared to 21 cases in 2015. The age range was 11 to 94 years of age. Cases occurred in four regions of the state; three in the northern region, two in the central region, two in the northwest, and one in the southwest region. No fatalities were attributed to WNV in 2016.

Arboviral cases occurred throughout the year, but locally-acquired arboviral infection (WNV) occurred only from July through September (Figure 3). Cases of imported dengue were reported nearly year round, except March and December, while cases of imported chikungunya were reported in three time periods of the year, January – February, May – June, and September. As these diseases were acquired out of the country, any seasonality would be based on travel patterns and seasonality of the illness in the endemic countries of origin.



Animal

Several jurisdictions in Virginia have surveillance programs that routinely test for the presence of arboviruses in mosquitoes and sentinel chickens. These jurisdictions are limited to northern Virginia, the Richmond metropolitan area, and Hampton Roads. While jurisdictions in all three regions perform surveillance for WNV, only jurisdictions located in the Hampton Roads region conduct surveillance for EEE. Sentinel chicken flocks are maintained by surveillance programs in the Hampton Roads area only. Veterinary records for other animals are also obtained from around the state by the Virginia Department of Agriculture and Consumer Services (VDACS) Veterinary Program; this agency surveys for cases of arboviral infection in equines and other animals statewide. There are no mosquito or zoonotic surveillance and testing programs in place for LAC or SLE viruses.

In 2016, arboviral surveillance programs tested 363,501 mosquitoes for WNV, 117,683 for EEE, and 67,688 for Zika virus. All mosquitoes were tested as “pools” (i.e., batches of approximately 20 to 50 mosquitoes). Of the 10,518 pools tested for WNV, less than 1% (n=88) tested positive. Of the 2,641 pools tested for EEE, 3% (n=90) tested positive. All 1,949 pools tested for Zika virus were negative. Among the positive pools, each was likely to have only contained one infected mosquito. Of the 88 WNV positive pools, 77 were collected in northern Virginia, 9 in eastern Virginia, and 2 in central Virginia. All of the EEE positive pools were collected in eastern Virginia.

In 2016, seven EEE-infected horses were reported across Virginia with six in the eastern region and one in the central region. Testing of sentinel chickens revealed four WNV-positive chickens in the Chesapeake and Suffolk area, and 25 EEE-positive chickens in the Chesapeake, Norfolk, Suffolk, and Virginia Beach area.